

REMARKS

Claims 14, 16, 18-20, 22-46 and 49-51 are rejected. Claims 14, 16, 18-20, 22, 24-35, 37-46 and 49-51 are presently pending in the application. Favorable reconsideration of the application in view of the following remarks is respectfully requested.

Rejection of Claims 14, 16, 22, 24-28, 29-5, 37-46 and 49-51 Under 35 U.S.C. §102(e):

The Examiner has rejected Claims 14, 16, 22, 24-28, 29 5, 37-46 and 49-51 under 35 U.S.C. 102(e) as being anticipated by Acquarulo (US 6,833,392), which discloses a composition comprising clay and block copolymer in which one of the block polymers disclosed is PERAX, a copolymer of nylon and polyether, utilized to make a nanocomposite with clay (such as montmorillonite) to form a nanocomposite. The Examiner indicates that Acquarulo also teaches that clay can be modified with cationic surfactant such as ammonium cations that undergo cationic exchange with clay followed by incorporation into matrix polymer such as polyolefins including polypropylene, polyethylene, polystyrene or polyesters to make a molded article and, therefore, the prior art of Acquarulo anticipates requirements of claims rejected above.

Acquarulo discloses a polymer composite comprising a polymer matrix having dispersed therein, a nano clay in combination with a crosslinking promotor. (Abstract) Acquarulo teaches that, without some additional treatment, the matrix polymer will not infiltrate into the space between the layers of the additive sufficiently and the layers of the layered inorganic material will not be sufficiently uniformly dispersed in the polymer. (col. 1, lines 23-24) Acquarulo discloses a number of techniques for dispersing individual layers, e.g., platelets, of the layered inorganic material, throughout the polymer, including exchange with organic cations (e.g., alkylammonium ions) to intercalate the individual layers of the multilayered materials prior to subsequently mixing the layered material (conventionally referred to as "nanofillers") with a monomer and/or oligomer of the polymer (col. 1, lines 30-40), dispersing an intercalated layered, particulate material having reactive organosilane compounds in a thermoplastic polymer or vulcanizable rubber (col. 1, lines 44-48), and surface modification of nano clay fillers (col. 1, lines 58-64). Acquarulo teaches that Montmorillonite nano clays have a plate like structure and are hydrophilic, making them not

compatible with most polymers and should be chemically modified to make the clay surface more hydrophobic. (col. 2, line 65 col 3, line 1) The most widely used surface treatments are ammonium cations which are exchanged for existing cations already on the surface of the clay followed by incorporation of the treated clayed into the polymer matrix. (col. 3, lines 1-5) Acquarulo fails to mention a clay intercalated with polyether block polyamide copolymer. Acquarulo also fails to mention a clay intercalated with polyether block polyamide copolymer and dispersed in a matrix polymer of polyolefin or polyester.

A claim is anticipated under 102(e) only if each and every element as set forth in the claim is found, either expressly or inherently, in a single prior art reference. Verdegaal Bros. V. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The present claims are directed to an extruded base for an imaging element comprising a matrix polymer of polyolefin or polyester and an intercalated clay, wherein the clay is intercalated with polyether block polyamide copolymer. Acquarulo fails to mention intercalation of the clay by a polyether block polyamide copolymer. Instead, at col. 3, lines 20-32, Acquarulo states that the block copolymer is used as a matrix polymer. ("In addition, the polymer matrix herein may be selected from any thermoplastic or thermoset type polymer resin host. A representative thermoplastic resin herein is a nylon resin, a nylon block copolymer, nylon block copolymers containing a polyamide block and an elastomeric block, engineering thermoplastic resins (e.g., polycarbonate, polyesters, polysulphoncs, polyketones, polyetherimides) as well as commodity type materials (polyethylene, polypropylene, polystyrene, poly(vinylchloride)) including thermoplastic elastomers. Representative thermoset materials include polyurethanes, epoxy polymers, etc.").

Neither is the intercalation of the clay with polymer an inherent characteristic. As disclosed by Acquarulo, clays are not readily dispersable in matrix polymers, but require some treatment, i.e, intercalation. Merriam-Webster Online Dictionary defines "intercalate" as "to insert between or among existing elements or layers." It is known in the art that, with intercalation of a polymer in the clay gallery, an increase in the basal spacing of the clay is observed. See U.S. Pat. No. 5,891,611, Col 5, lines 14-17. It is also known that the dispersion of clay particles in a polymer matrix can result in the formation of three general types of composite materials as discussed by Lan et al (T. Lan, P. D. Kaviratna and T. J.

Pinnavia, Chem. Mater. 7, 2144(1995)). (1) Conventional composites may contain clay with the layers unintercalated in a face-to-face aggregation. Here the clay platelet aggregates are simply dispersed with macroscopic segregation. (2) Intercalated clay composites are intercalation compounds of definite structure formed by the insertion of one or more molecular layers of polymer into the clay host galleries. (3) Finally, exfoliated clay-polymer composites where singular clay platelets are dispersed in a continuous polymer matrix. See U.S. Pat. No. 5,891,611, Col. 4, line 62 – col. 5, line 7.

Since Acquarulo fails to disclose the use of a matrix polymer of polyolefin or polyester and an intercalated clay, wherein the clay is intercalated with polyether block polyamide copolymer, to form an extruded base for an imaging element, either expressly or inherently, the reference fails to anticipate the present claims and the rejection should be withdrawn.

Rejection Of Claims 14, 16, 18-20, 22-35, 37-46 and 49-51 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 14, 16, 18-20, 22, 24-35, 37-46 and 49-51 under 35 U.S.C. 103(a) as being unpatentable over FISHER (US 6,579,927), indicating that FISHER discloses a composition for nanocomposite material comprising block copolymer, clay and matrix copolymer, the block copolymer of FISHER has block (A) compatible with the clay component and block (B) compatible with the matrix resin, the matrix polymer of the prior art of FISHER is selected from polyesters such as polyethylene terephthalate, polyamides, polyolefins such as polyethylene or polypropylene and the like, the prior art of FISHER discloses that already patented composition can be utilized to make any type of molded article and, therefore, in the light of the above discussion, it would have been obvious for one having ordinary skill in the art at the time of the instant invention to utilize the prior art of FISHER to obtain the claimed invention.

Fischer discloses a nanocomposite material of clay in a polymeric matrix, including a block copolymer or a graft copolymer which has an (A)-block compatible with the clay and a (B)-block compatible with the polymeric matrix. Fischer fails to disclose the use of the nanocomposite material in an extruded imaging support. Fischer also fails to disclose the use of clay, intercalated with a

polyether block polyamide copolymer, which is dispersed in a matrix polymer of polyolefin or polyester.

The present invention relates to an extruded imaging element comprising a support of intercalated clay intercalated with a polyether block polyamide copolymer in a matrix polymer of polyolefin or polyester.

To establish a *prima facie* case of obviousness requires, first, there must be some suggestion or motivation, either in the reference itself, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998).

Fischer teaches nanocomposite materials comprising block copolymer, clay and matrix copolymer. The block copolymer of FISCHER has hydrophilic block (A) compatible with the clay component and block (B) compatible with the matrix resin for use in packaging and construction materials. Fischer fails to mention the use of intercalated clay, intercalated with a polyether block polyamide copolymer, for use as an extruded base or support for an imaging element. Fischer also fails to disclose the use of clay, intercalated with a polyether block polyamide copolymer, which is dispersed in a matrix polymer of polyolefin or polyester. In addition, Fischer teaches in col.3, lines 61-66 that *"The structural units (B) are compatible with the polymeric matrix. By this is meant that these units in themselves, i.e. not in the copolymeric form with the structural units (A), are excellently mixable with the material of the polymeric matrix. It is also possible that the nature of the structural units (B) is the same as the nature of the polymeric matrix."* The Examiner also notes that the block copolymer of FISHER has block (A) compatible with the clay component and block (B) compatible with the matrix resin. However, the present claims are directed to clay, intercalated with a polyether block polyamide copolymer and dispersed in a matrix polymer of polyolefin or polyester. Polyamide and polyether, the components of the presently claimed block copolymer, are neither *"excellently mixable"* nor of the *"same as the nature of the polymeric matrix"*,

but are considered immiscible with the presently claimed matrix binder. This fact is known in the art. See Attachment A, *Polymer Alloys and Blends: Thermodynamics and Rheology*, Leszak A, Ultracki, Hanser Publishers, Munich Vienna New York, 1990, pgs. 172, 207, and 213. See also Attachment B, *Analysis of the morphology of polymer blends using ultrasound*, Claude Verdier and Monique Piau 1996, J. Phys. D: Appl. Phys. 29, 1454-1461. Therefore, one would not use the teachings of Fischer to predict that the presently claimed block copolymer intercalant could be used with the presently claimed matrix polymer with which it is immiscible. As a result, Fischer fails to suggest modification of the reference to produce an extruded base for an imaging element comprising intercalated clay, intercalated with a polyether block polyamide copolymer as presently claimed.

Fischer also offers no expectation that intercalated clay, intercalated with a polyether block polyamide copolymer, may be used as an extruded base or support for an imaging element when dispersed in a matrix polymer of polyolefin or polyester. There are a very large number of clays, block copolymers and matrix copolymers disclosed in Fischer and known to those skilled in the art. Although Fischer teaches that the nanocomposite composition of the prior art can be utilized to make molded articles of any kind, in the absence of any suggestion in Fischer to extrude an imaging base utilizing the claimed nanocomposite material, at most, it might only be "obvious to try" the combination of the present invention for extruding an imaging base. There is no reasonable expectation of success found in the cited reference to indicate that a copolymer with a B-block that is immiscible with the matrix polymer will be useful as taught in Fischer.

Finally, Fischer fails to make mention the use of clay, intercalated with a polyether block polyamide copolymer, in a matrix polymer of polyolefin or polyester for use as an imaging elements or production of an extruded imaging element as required by the present claims.

In addition, the present invention provides surprising results. As indicated by the prior art (Attachments A and B above), polyether block polyamide copolymer would be expected to be incompatible with a matrix polymer of polyolefin or polyester. However, the combination as claimed forms an imaging element support with acceptable and useful properties, including

improved Young's modulus. Also, as noted on page 28, lines 16 – 22, the intercalated clay, intercalated with a polyether block polyamide copolymer, as presently claimed has antistatic properties, a particularly useful property in photographic supports.

As discussed above, the Applicants request reconsideration of the rejection, believing that Fischer fails to discuss or suggest the specific limitations of the present invention, fails to teach or suggest modification of the reference and fails to provide any likelihood of success.

Rejection Of Claims 18-20, and 23 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 18-20, and 23 under 35 U.S.C. 103(a) as being unpatentable over ACQUARULO (US 6,833,392) in view of FISHER (US 6,579,927), as it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the polyesters of FISHER in the composition of FISHER and thereby arrive at the present invention.

As discussed above, the Applicants believe that the presently claimed invention is not obvious in light of the cited references to Acquarulo in view of Fischer. In order to support a finding of prima facie obviousness, references must contain a suggestion or motivation to combine, must give some reasonable expectation of success, and must teach or suggest all claim limitations. As discussed above, the Applicants believe that Fischer fails to discuss or suggest the specific limitations of the present invention, fails to teach or suggest modification of the reference and fails to provide any likelihood of success. Acquarulo also fails to teach or suggest modification of the references, either alone or combined, as Acquarulo fails to teach intercalation of clay with polyether block polyamide copolymer – intercalated clay or intercalation of clay with polyether block polyamide copolymer – intercalated clay followed by dispersion in a matrix polymer of polyolefin or polyester.

At best, a combination of the references would produce a nanocomposite material comprising block copolymer, clay and matrix copolymer, the block copolymer having hydrophilic block (A) compatible with the clay component and block (B) compatible with the matrix resin PEBAX, not the presently claimed clay, intercalated with polyether block polyamide copolymer in a matrix polymer of polyolefin or polyester.

Since the cited references do not teach, suggest or disclose the present invention when considered as a whole with all limitations, the Applicants respectfully suggest that the cited references do not support a rejection based on obviousness.

Rejection Of Claims 14, 16, 18-20, 22-35, 37-46 and 49-51 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 14, 16, 18-20, 22-35, 37-46 and 49-51 under 35 U.S.C. 103(a) as being unpatentable over O'NEIL (WO 01/034685), indicating that the prior art of O'NEIL discloses clay/polymer composites that can be formed into an article by melt blending and extrusion, a montmorillonite type clay that can be intercalated with ammonium type compounds (page 4, line 15, page 1, line 23), Example 2 specifically discloses polyamide ether block copolymer, Claims 8 and 9 further teach that the polyamide block is nylon block and the elastomeric block is polyether, polyester and the like, Example 2 of O'NEIL further discloses use of second polymer, which is nylon, the specification on page 5 further teaches use of polyolefins, polyesters and the like, the composition can be utilized to make flexible extruded article having improved mechanical properties, and, therefore, it would have been obvious to one having ordinary skill to utilize composition of O'NEIL as a base or a substrate and therefore obtain the claimed invention.

O'Neil discloses nano clays for use in thermoplastic/ thermoset polymer materials, wherein the nano clay may be combined with another chemical ingredient, such as a crosslinking agent, to thereby provide a unique and overall synergistic effect on mechanical property performance.

In order to support a finding of prima facie obviousness, references must contain a suggestion or motivation to combine, must give some reasonable expectation of success, and must teach or suggest all claim limitations. The reference to O'Neil teaches that the clay used is Montmorillonite type clay that can be intercalated with ammonium type compounds and that the intercalating polymer is block copolymers. Also, O'Neil pg. 5, lines 5-10 indicate that the block copolymers are used as matrix polymers, not intercalants for the clay. O'Neil fails to teach or suggest that block copolymers, specifically, polyether block polyamide copolymers can be used as clay intercalants. O'Neil also fails to teach the utility of just the polyether block polyamide copolymer – intercalated

clay in a matrix polymer of polyolefin or polyester as an extruded article. Neither does O'Neil provide any likelihood of success for the use of block copolymer, specifically, polyether block polyamide copolymers intercalants, teaching instead that, to be used in block copolymers, the clay is already intercalated by some other material, not the presently claimed block copolymer. The Examples of O'Neil utilize Nancor TGC 130 Clay and Cloisite 30B. Review of the literature available from the suppliers of these products indicate that both materials used in the Examples are intercalates, that is, clay materials intercalated with surface treating materials (intercalants), prior to combination with Nylon or PEBAX, supporting the Applicants position that the reference fails to teach the use of block copolymer as intercalant ("clay intercalated with polyether block polyamide copolymer"). See Attachment C (directions to Nancor web page), Attachment D (definitions from Nancor web page, including intercalate, intercalant, Nanomer nanoclays), Attachment E (describing surface treatment / intercalation of natural clay prior to combination with matrix polymer to produce exfoliation), Attachment F (description of Cloisite 30B as modified montmorillonite). Finally, O'Neil fails to teach the intercalation of clay with a polyether block polyamide copolymer in a matrix polymer of polyolefin or polyester for use as an extruded imaging element as presently claimed. Claims 8 and 9 depend from claim 7 and describe the matrix polymer, not the clay intercalant. Example 2 also relates to variation of the matrix polymer, replacing the matrix polymer of Example 1, nylon, with the matrix polymer PEBAX, again, not the clay intercalant.

The Examiner indicates that the intercalating polymer is block copolymers. The Applicants have been unable to locate the section in O'Neil that states that the intercalating polymer is block copolymers and request the Examiner specifically cite the line and page number.

The Examiner notes that "the present invention does not exclude use of additional intercalants and that, with respect to PE/PA polymer, it is clear from the disclosure of O'NEIL that PE/PA can be viewed as intercalant. It is incorporated into the clay platelets but it does not cause exfoliation of the clay platelets. Clay platelets are exfoliated upon incorporation into polymer matrix and sheer action of the equipment by which they are processed." However, the present claims require that the polyether block polyamide copolymer functions as an intercalant, that is, enters the layers of clay, swelling them sufficiently to allow

combination with the polymer matrix of polyolefin or polyester. Even if another intercalant is present, the polyether block polyamide copolymer is required by the claims to function as an intercalant, not as a dispersing matrix.

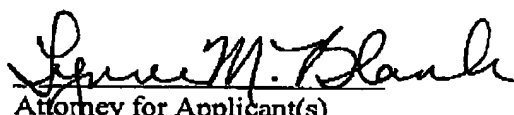
As discussed above, it is known in the art that "Swellable layered materials, such as the preferred smectite clay materials, generally require treatment by one or more intercalants to provide the required interlayer swelling and/or polymer compatibility. The resulting interlayer spacing is critical to the performance of the intercalated layered material in the practice of this invention. As used herein, the "interlayer spacing" refers to the distance between the faces of the layers as they are assembled in the intercalated material before any delamination (or exfoliation) takes place." U.S. Pat. No. 6,475,696, col. 5, lines 15-24. In the untreated state, the clay "materials do not delaminate in host polymer melts regardless of mixing because their interlayer spacings are usually very small (typically equal to or less than about 0.4 nm), and consequently the interlayer cohesive energy is relatively strong." U.S. Pat. No. 6,475,696, col. 5, lines 26-30. "Layered materials are intercalated by swelling agents of sufficient size to increase interlayer distances to the desired extent." U.S. Pat. No. 6,475,696, col. 5, lines 32-34.

The prior references fail to teach the use of polyether block polyamide copolymer as an intercalant used to swell the layered material, allowing dispersion/exfoliation in a matrix polymer. The Examples of the present invention show that the addition of polyether block polyamide copolymer to natural montmorillonite, Cloisite Na (Attachment G), with a basal spacing of 10 angstroms (Table I, pg. 26), results in a swelling of the basal spacing to 18 angstroms (Table 2, Ex. 1, 8, and Comp A, pg. 27), indicative of intercalation of the clay. The Examples also indicate that surface modified clays 25A (Attachment H), 20A (Attachment I), 15A (Attachment J) and 6A, with basal spacing of 21 angstroms, 25 angstroms, 32 angstroms, and 34 angstroms, respectively are further swelled / intercalated by the addition of polyether block polyamide copolymer, as indicated by further swelling to 32 angstroms, 38 angstroms, 37 angstroms, and 37 angstroms, respectively, indicative of additional intercalation beyond that achievable with simple surface treatment of the clay. See Table 2, pg. 27). Exfoliation is expected at basal separations of 70 angstroms. (Attachment K)

Since the cited reference to O'Neil does not teach, suggest or disclose the present invention when considered as a whole with all limitations, the Applicants respectfully suggest that the cited reference does not support a rejection based on obviousness.

It is believed that the foregoing is a complete response to the Office Action and that the claims are in condition for allowance. Favorable reconsideration and early passage to issue is therefore earnestly solicited.

Respectfully submitted,


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Enclosures: Attachments A-K

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